CLAIMS

1. A drive circuit for a pulsed flashlamp including:

a capacitor chargeable to a voltage sufficient when applied across said lamp to maintain a desired optical output;

an inductor connected in series with said lamp;

a high speed semiconductor switch connected to, when off, block discharge of said capacitor and to, when on, permit discharge of said capacitor through said inductor and lamp;

a one-way path for current flow from said inductor through said lamp at least when said switch is off;

a sensor for power through said lamp; and

a control operative in response to said sensor to control the on/off state of said switch to maintain the ratio of the power deviations through said lamp to the average pulsed lamp power substantially constant over a desired range of average pulsed lamp power .

2. A circuit as claimed in claim 1 including a reference voltage V_{ref} applied to said control, V_{ref} being a function of the selected average pulsed lamp power, said control comparing a function of V_{ref} against a voltage function of the sensor output to control the on/off state of said switch.

3. A circuit as claimed in claim 2 wherein said switch is turned off when the function of sensor output is greater than a first function of $V_{ref}(V_{ref1})$ and is turned on when the function of sensor output is less than a second function of $V_{ref}(V_{ref2})$, where $V_{ref1} > V_{ref2}$.

4. A circuit as claimed in claim 3 wherein said control includes a comparator having V_{ref} applied as one input and an output from the sensor applied as a second input, said comparator being configurable to achieve a desired hysteresis power ΔP.

5. A circuit as claimed in claim 4 wherein said comparator includes a difference amplifier, V_{ref} being applied to one input of the amplifier through a reconfigurable first voltage

divider, and the output from the sensor being applied to a second input of the amplifier through a second voltage divider, said first voltage divider normally being configured to provide V_{ref1} to the amplifier and being reconfigured in response to an output from the amplifier when the switch is off to provide V_{ref2} to the amplifier.

6. A circuit as claimed in claim 4 wherein said comparator includes an error amplifier, V_{ref} being applied to one input of the error amplifier and the output from the sensor being applied to a second input of the error amplifier, the output from the error amplifier being applied through a reconfigurable voltage divider to one input of a difference amplifier, and a voltage indicative of lamp current being applied to a second input of the difference amplifier, said voltage divider normally being configured to provide V_{ref1} to the difference amplifier and being reconfigured when the switch is off to provide V_{ref2} to the difference amplifier.

7. A circuit as claimed in claim 2 wherein said lamp generates output pulses of a duration t_p, said switch being turned on and off multiple times during each said output pulse.

8. A circuit as claimed in claim 7 wherein said control includes a control which selectively varies V_{ref} during each said output pulse to achieve a selected output pulse shape.

9. A circuit as claimed in claim 1 wherein said lamp generates output pulses of a duration t_p, said switch being turned on and off multiple times during each said output pulse.

10. A circuit as claimed in claim 9 wherein said capacitor is recharged between said output pulses.

11. A circuit as claimed in claim 9 wherein said path includes a diode in a closed path with said inductor and lamp, said inductor maintaining current flow through said lamp and diode when said switch is off.

12. A circuit as claimed in claim 11 including a mechanism which inhibits current flow through said diode from said switch during transition periods when said switch is being turned on and said diode is being turned off.

13. A circuit as claimed in claim 12 wherein said mechanism is a saturable inductor in series with said diode.

14. A circuit as claimed in claim 12 including a saturable inductor in series with said switch which inhibits current flow through said switch during transition periods when said switch is being turned on and said diode is being turned off.

15. A circuit as claimed in claim 1 wherein said inductor includes an inductive coil wound on a magnetic core which is non-saturating in the operating ranges of said circuit.

16. A circuit as claimed in claim 15 wherein said magnetic core is a powdered iron core.

17. A circuit as claimed in claim 15 wherein said coil has a plurality of windings and is also wound on a second core having low losses at high frequency, and including a primary coil having a number of windings which is a small fraction of said plurality of windings and which is wound at least on said second core, and a circuit for selectively applying a voltage to said primary coil, said voltage resulting in a step-up trigger voltage in said coil having a plurality of windings, which trigger voltage is applied to initiate breakdown in said lamp.

18. A circuit as claimed in claim 17 wherein said second core is a linear ferrite core.

19. A circuit as claimed in claim 17 including a DC simmer current source connected to maintain discharge in said lamp

20. A drive circuit for a pulsed flashlamp including:

a capacitor chargeable to a voltage sufficient when applied across said lamp to maintain a desired optical output;

an inductor connected in series with said lamp;

a high speed semiconductor switch connected to, when off, block discharge of said capacitor. and to, when on, permit discharge of said capacitor through said inductor and lamp;

a one-way path for current flow from said inductor through said lamp at least when said switch is off; and

controls for selectively turning said switch on and off to maintain said desired optical output from the lamp;

said inductor including an inductance coil having a plurality of windings which is wound on both a magnetic core which is non-saturating at the operating ranges for said circuit and a second core having low losses at high frequency, there being a primary winding on at least said second core having a number of windings which is a small fraction of said plurality of windings, and a circuit for selectively applying a voltage to said primary coil, said voltage resulting in a step-up trigger voltage in said coil having a plurality of windings, which trigger voltage is applied to initiate breakdown in said lamp.

21. A circuit as claimed in claim 20 wherein said magnetic core is a powdered iron core.

22. A circuit as claimed in claim 20 wherein said second core is a linear ferrite core.

23. A circuit as claimed in claim 20 including a DC simmer current source connected to maintain discharge in said lamp

24. A drive circuit for a pulsed flashlamp including:

a capacitor chargeable to a voltage sufficient when applied across said lamp to maintain a desired optical output;

an inductor connected in series with said lamp;

a high speed semiconductor switch connected to, when off, block discharge of said capacitor. and to, when on, permit discharge of said capacitor through said inductor and lamp;

a one-way path for current flow from said inductor through said lamp at least when said switch is off;

controls for selectively turning said switch on and off to maintain said desired optical output from the lamp, said controls having a reference parameter applied thereto which determines lamp conditions at which switching of said switch occurs; and

a mechanism which selectively varies the reference parameter to achieve a selected lamp output pulse shape.

25. A drive circuit as claimed in claim 24 wherein said reference parameter is a reference voltage, and wherein said lamp conditions include average pulsed lamp power.

26. A drive circuit for a pulsed flashlamp including:

a capacitor chargeable to a voltage sufficient when applied across said lamp to maintain a desired optical output;

an inductor connected in series with said lamp;

a high speed semiconductor switch connected to, when off, block discharge of said capacitor. and to, when on, permit discharge of said capacitor through said inductor and lamp;

a one-way path for current flow from said inductor through said lamp at least when said switch is off, said path including a diode in a closed path with said inductor and lamp, said inductor maintaining current flow through said lamp and diode when said switch is off;

a mechanism which inhibits current flow through said diode from said switch during transition periods when said switch is being turned on and said diode is being turned off; and

controls for selectively turning said switch on and off to maintain said desired optical output from the lamp.

27. A circuit as claimed in claim 26 wherein said mechanism is a saturable inductor in series with said diode.

28. A circuit as claimed in claim 27 including a saturable inductor in series with said switch which inhibits current flow through said switch during transition periods when said switch is being turned on and said diode is being turned off.